

## 6 References

The *Introduction to symplectic topology* by McDuff and Salamon is THE introduction to the subject. There are three sets of notes on symplectic geometry that I find useful, each with its individual flavor: those by Cannas da Silva, Meinrenken and Gromov. The ones by Cannas da Silva are the easiest to manage with less mathematical background. While I have not used them, I expect that the notes by Jonathan Evans would also provide a good introduction, bridging the levels of the basic and advanced courses given this week. Note that Gromov discusses canonical forms for the matrices representing general bilinear forms with no constraint that they be non-degenerate, symmetric or skew symmetric.

There are several other books and sets of online notes; their absence from this list only reflects my intent to keep this list short.

Concerning proofs that the determinant of a symplectic matrix equals 1:

The most standard way to prove this fact is by considering the symplectic form on  $\mathbb{R}^{2n}$  as a differential form and showing that its top wedge power is a volume form. Cannas da Silva outlines this proof for the bilinear form  $\omega_0$  using the exterior product on the vector space  $\mathbb{R}^{2n}$ . The thesis by Feitas contains a geometrically revealing proof (as Proof 2 on p.14). Meinrenken shows that the determinant of a symplectic matrix is 1 by showing that the group of symplectic matrices is connected. Meanwhile, several proofs are gathered in the paper by Mackey and Mackey.

**Cannas da Silva, Ana.** *Lectures on Symplectic Geometry.* Lecture Notes in Mathematics, 1764. Springer-Verlag, Berlin, 2001. <http://www.math.ist.utl.pt/acannas/Books/lsg.pdf>

**Evans, Jonathan.** *A First Course in Symplectic Topology.*  
<http://www.math.ethz.ch/evansj/sympcourse.htm>

**Freitas, Pedro Jorge.** *On the Action of the Symplectic Group on the Siegel Upper Half Plane.* Thesis, University of Chicago, 1996. <http://ptmat.fc.ul.pt/pedro/thesis.pdf>

**Mackey, Nilfour; Mackey, D. Steven.** “On the Determinant of Symplectic Matrices.” Numerical Analysis Report No. 422, Manchester Centre for Computational Mathematics, Manchester, England. February 2003. <http://math.nju.edu.cn/guoxj/notes/detsymp.pdf>

**Meinrenken, Eckhard.** *Symplectic Geometry, Lecture Notes, University of Toront.* Unpublished. <http://www.math.toronto.edu/mein/teaching/sympl.pdf>

**Gromov, Mikhael.** *Lectures on Symplectic Geometry.* Compiled by Richard Brown; edited by Robert Miner. Unpublished.

**McDuff, Dusa; Salamon, Dietmar.** *Introduction to symplectic topology.* Second edition. Oxford Mathematical Monographs. The Clarendon Press, Oxford University Press, New York, 1998.